

CLAIMS:

1. A fastener driving tool comprising:
 - a tool body;
 - a driver guide coupled to the tool body and defining a fastener driving channel;
 - a magazine coupled to the driver guide and arranged and constructed to store fasteners;
 - a pusher plate arranged and constructed to feed the fasteners individually into the fastener driving channel;
 - a driver arranged and constructed to drive out the fasteners fed into the fastener driving channel;
 - a trigger operable by an operator in order to actuate the driver;
 - an idle driving prevention device arranged and constructed to prevent a driving operation when no fastener exists within the fastener driving channel, the idle driving prevention device comprising:
 - a stopper member coupled to the trigger and movable in response to the operation of the trigger;
 - a detection recess defined in an inner wall of the fastener driving channel in a position not opposing the head of the fastener that has been fed into the fastener driving channel, and
 - a restriction plate disposed within the magazine and having an end portion, wherein:
 - the restriction plate is biased in a fastener feeding direction;
 - the restriction plate moves together with the pusher plate in the fastener feeding direction when the fastener is positioned within the fastener driving channel; and
 - the end portion of the restriction plate enters the at least one detection recess to permit movement of the restriction plate in the fastener feeding direction relative to the pusher plate in order to engage the stopper member for inhibiting the operation of the trigger when no fastener is positioned within the fastener driving channel.
2. A fastener driving tool as in claim 1, wherein the magazine is configured to store plural kinds of available fasteners that vary with respect to length, such that ends of the fasteners

opposite to the heads are positioned within the magazine at the same reference level irrespective of difference in kind, and

wherein the detection recess is disposed at a position spaced in the fastener driving direction from the head of the fastener that has a shortest available length accommodated by the magazine.

3. A fastener driving tool as in claim 1, wherein the magazine is configured to store plural kinds of available fasteners that vary with respect to length, such that ends of the fasteners opposite to the heads are positioned within the magazine at the same reference level irrespective of difference in kind, and

wherein the detection recess is disposed at a position spaced in a direction opposite to the fastener driving direction from the head of the fastener having a longest available length accommodated by the magazine when the end of the fastener opposite the head contacts a workpiece during the driving operation of the fastener through the fastener driving channel.

4. A fastener driving tool as in claim 1, wherein the magazine is configured to store plural kinds of available fasteners that are different with respect to length such that ends of the fasteners opposite to the heads are positioned within the magazine at the same reference level irrespective of difference in kind, and

wherein the detection recess is disposed at a position spaced in the fastener driving direction from the head of the fastener that has a shortest available length accommodated by the fastener driving channel, and

wherein the detection recess is spaced in a direction opposite to the fastener driving direction from the head of the fastener having a longest available length accommodated by the magazine when the end of the fastener opposite the head contacts a workpiece during the driving operation of the fastener through the fastener driving channel.

5. A fastener driving tool as in claim 1, wherein the stopper member further includes an engaging recess and the restriction plate further includes a stopper edge,

wherein the movement of the stopper member in response to the operation of the trigger is restricted when the stopper edge engages the engaging recess, and

wherein an inclined surface with respect to the moving direction of the stopper member is formed on one of a portion of the stopper member adjacent to the engaging recess and the stopper edge of the restriction plate, so that the restriction plate is shifted in a direction away from the fastener driving channel through sliding contact between the inclined surface and one of the portion of the stopper member and the stopper edge as the stopper member moves in response to the operation of the trigger at least during the driving operation of a last fastener.

6. A fastener driving tool comprising:

a tool body;

a driver guide coupled to the tool body and defining a fastener driving channel;

a magazine coupled to the driver guide and arranged and constructed to store fasteners;

a detecting device arranged and constructed to detect when no fastener exists within the fastener driving channel, wherein:

the detecting device includes a detection member and a detection recess formed in the fastener driving channel, the detection member having a front end contact portion, wherein the front end contact portion is in contact with at least one fastener stored within the magazine, so that the front end of the detection member engages the detection recess when no fastener exists within the magazine and the fastener driving channel, and

the detection recess is positioned so as to not oppose to a head of the fastener that has been fed into the fastener driving channel.

7. A fastener driving tool as in claim 6, wherein the detection member is movable by a distance greater than a thickness of the fastener when a last fastener has been driven out from the fastener driving channel.

8. A fastener driving tool as in claim 7, wherein the magazine is configured to store plural kinds of available fasteners that vary with respect to length such that ends of the fasteners opposite to heads of the fasteners are positioned at the same reference level within the magazine irrespective of difference in kind, and

wherein the at least one detection recess is disposed at a position spaced in the fastener driving direction from the head of the fastener that has a shortest available length accommodated by the magazine.

9. A fastener driving tool as in claim 7, wherein the magazine is configured to store plural kinds of available fasteners that vary with respect to length such that ends of the fasteners opposite to heads are positioned at the same reference level within the magazine irrespective of difference in kind, and

wherein the at least one detection recess is disposed at a position spaced in a direction opposite to the fastener driving direction from the head of the fastener having a longest available length accommodated by the magazine, the at least one detection recess position determined at a point in time when the end of the fastener opposite to the head contacts a workpiece during the driving operation of the fastener through the fastener driving channel.

10. A fastener driving tool as in claim 7, wherein the magazine is configured to store plural kinds of available fasteners that are different with respect to length such that ends of the fasteners opposite to the heads are positioned at the same reference level within the magazine irrespective of difference in kind, and

the at least one detection recess includes a first detection recess and a second detection recess, and

wherein the first detection recess is disposed at a position spaced in the fastener driving direction from the head of the fastener that has a shortest available length accommodated by the magazine, and

wherein the second detection recess is spaced in a direction opposite to the fastener driving direction from the head of the fastener having a longest available length accommodated by the magazine, the second detection recess position determined at a point in time when the end of the fastener opposite to the head contacts a workpiece during the driving operation of the fastener through the fastener driving channel.

11. A fastener driving tool as in claim 7, further including a trigger operable by an operator in order to drive out the fastener fed into the fastener driving channel, and

an engaging member coupled to the trigger so that the engaging member moves together with the trigger as the trigger is operated, and

wherein the detection member is engageable with the engaging member to prevent the trigger from being operated when the front end of the at least one detection member enters the detection recess.

12. A fastener driving tool as in claim 11, further including a driver that is movable within the fastener driving channel in order to apply an impact to a head of the fastener fed into the fastener driving tool when the trigger is operated.

13. A fastener driving tool as in claim 12, wherein the engaging member includes an engaging recess and the detection member includes an engaging edge engageable with the engaging recess, and

wherein the engaging member has an inclined surface inclined with respect to the moving direction of the engaging member and formed in continuity with the engaging recess, so that the detection member is shifted in a direction away from the fastener driving channel through sliding contact between the inclined surface and the engaging edge, at least as the engaging member moves in response to the operation of the trigger in order to drive out a last fastener fed into the fastener driving channel.

14. A fastener driving tool as in claim 7 further including a pusher plate that is biased in the fastener feeding direction toward the fastener driving channel and has a front end that contacts a last fastener included in a fastener strip when the last fastener is within the magazine and when the last fastener is within the fastener driving channel, so as to urge the fastener strip toward the fastener driving channel,

wherein the pusher plate is a separate component from the at least one detection member.

15. A fastener driving tool comprising:

a tool body;

a driver guide coupled to the tool body and defining a fastener driving channel;

a magazine coupled to the driver guide and arranged and constructed to store at least one type of fastener, wherein the type of fastener can vary with respect to length;

a detecting device arranged and constructed to detect when no fastener exists within the fastener driving channel, wherein the detecting device includes a detection member biased in a fastener feeding direction and contacting a last one of the fasteners within the magazine;

a driver movable within the fastener driving channel in order to apply an impact to the head of the fastener fed into the fastener driving tool;

an impact prevention device arranged and constructed to prevent application of an impact to the detecting member by the driver when the last fastener is driven out from the fastener driving channel by the driver.

16. A fastener driving tool as in claim 15, further including a detection recess within the fastener driving channel,

wherein the detecting member engages the detection recess after the last fastener is driven out of the fastener driving channel, and

wherein the detection recess is positioned so as to not oppose a head of the types of fastener accommodated by the magazine.

17. A fastener driving tool as in claim 15, further including:

a trigger operable by an operator in order to drive out the at least one type of fastener fed into the fastener driving channel; and

an engaging member coupled to the trigger so that the engaging member moves together with the trigger as the trigger is operated, wherein the detection member is engageable with the engaging member to prevent the trigger from being operated when the detection device detects no fastener within the fastener driving channel,

the impact prevention device comprises a cam mechanism provided between the detection member and the engaging member, so that the detection member is moved away from the fastener driving channel as the engaging member is moved together with the trigger at least when the trigger is operated to drive out the last fastener.

18. A fastener driving tool as in claim 17, wherein the engaging member moves substantially perpendicular to the fastener feeding direction and the cam mechanism includes an inclined surface formed on at least one of the engaging member and the detection member and is inclined with respect to the moving direction of the engaging member.